

In the Claims:

*Please cancel Claim 1*

- 1     2.     (New) A method of soft decision decoding, the method comprising the steps of:  
2         a.     receiving an input signal over a channel; and  
3         b.     approximating a Log-Likelihood-Ratio result of the input signal, wherein  
4               the Log-Likelihood-Ratio result is independent of a signal to noise ratio  
5               value calculable over the channel.
  
- 1     3.     (New) The method of soft decision decoding according to claim 2 wherein the  
2               step of approximating further comprises calculating an actual  
3               Log-Likelihood-Ratio value for each of a plurality of m bits per symbol  
4               contained in the input signal.
  
- 1     4.     (New) The method of soft decision decoding according to claim 3 wherein the  
2               step of approximating further comprises separating the actual Log-  
3               Likelihood-Ratio values into one or more n-regions, wherein n is an  
4               integer.
  
- 1     5.     (New) The method of soft decision decoding according to claim 4 wherein the  
2               step of approximating further comprises determining a constant,  $a_n$ , by  
3               computing a partial derivative for the actual Log-Likelihood-Ratio values  
4               in the one or more n-regions.
  
- 1     6.     (New) The method of soft decision decoding according to claim 5 wherein the  
2               step of approximating further comprises determining a slope for the actual  
3               Log-Likelihood-Ratio value for each of the plurality of m bits per symbol.  
4
  
- 1     7.     (New) The method of soft decision decoding according to claim 6 wherein the  
2               slope is determined by use of a linear equation, wherein the linear equation  
3               utilizes the constant  $a_n$ .

1        8.        (New) The method of soft decision decoding according to claim 6 wherein the  
2                    step of approximating further comprises quantizing the slope for each m  
3                    bit per symbol.

1        9.        (New) The method of soft decision decoding according to claim 8 wherein the  
2                    step of quantizing is performed using a quantizing equation  
3

$$Quantize = \left( LLR \frac{2^{\text{SOFT\_BITS}-1}}{qLIMIT} + 2^{\text{SOFT\_BITS}-1} \right)$$

5        wherein the SOFT\_BITS value and the qLIMIT value are dependent on the signal to  
6        noise ratio.

1        10.        (New) A method of soft decision decoding over a channel, the method  
2                    comprising the steps of:

- 3            a.        receiving an input signal over the channel, wherein the input signal has a  
4                    plurality of m bits per symbol;  
5            b.        calculating an actual Log-Likelihood-Ratio value for each of the plurality  
6                    of m bits per symbol;  
7            c.        determining a slope for the actual Log-Likelihood-Ratio value of each m  
8                    bit; and  
9            d.        quantizing the slope for each m bit per symbol and generating a  
10                   Log-Likelihood-Ratio result, wherein the Log-Likelihood-Ratio value is  
11                   independent of noise over the channel.

1        11.        (New) The method of soft decision decoding according to claim 10 further  
2                    comprising separating the actual Log-Likelihood-Ratio values into one or  
3                    more n-regions, wherein n is an integer.

1        12.        (New) The method of soft decision decoding according to claim 11 further  
2                    comprising determining a constant  $a_n$  by computing a partial derivative for  
3                    the actual Log-Likelihood-Ratio values in the one or more n-regions.

1     13.     (New) The method of soft decision decoding according to claim 12 wherein the  
2               slope is determined by use of a linear equation, wherein the linear equation  
3               utilizes the constant  $a_n$ .

1     14.     (New) The method of soft decision decoding according to claim 10 wherein the  
2               step of quantizing is performed using a quantizing equation  
3

$$Quantize = \left( LLR \frac{2^{SOFT\_BITS-1}}{qLIMIT} + 2^{SOFT\_BITS-1} \right)$$

5     wherein the SOFT\_BITS value and the qLIMIT value are dependent on the signal to  
6     noise ratio.

1     15.     (New) A method of soft decision decoding over a modulated channel wherein a  
2               signal to noise ratio may be calculated over the channel, the method comprising  
3               the steps of:

- 4               a.     receiving an input signal over the channel, wherein the input signal has a  
5                   plurality of m bits per symbol;
- 6               b.     calculating an actual Log-Likelihood-Ratio value for each of the plurality  
7                   of m bits per symbol, wherein the actual Log-Likelihood-Ratio value  
8                   includes a SOFT\_BITS value for each of the plurality of m bits per  
9                   symbol;
- 10              c.     separating the actual Log-Likelihood-Ratio values into one or more n-  
11                   regions, wherein n is an integer;
- 12              d.     determining a constant,  $a_n$  by computing a partial derivative for the actual  
13                   Log-Likelihood-Ratio values in the one or more n-regions;
- 14              e.     calculating a slope by use of a linear equation, wherein the linear equation  
15                   utilizes the constant  $a_n$ ; and
- 16              f.     quantizing the constant  $a_n$  by utilizing the quantizing equation  
17

$$Quantize = \left( LLR \frac{2^{SOFT\_BITS-1}}{qLIMIT} + 2^{SOFT\_BITS-1} \right)$$

1 wherein the SOFT\_BITS value and qLIMIT are dependent on the signal to noise ratio,  
2 the quantizing equation generating a quantized Logarithmic-Likelihood-Ratio result  
3 substantially independent of the signal to noise ratio over the channel.

1 16. (New) A Logarithmic Likelihood Ratio module for soft decision decoding over a  
2 modulated channel, the Logarithmic Likelihood Ratio module comprising:  
3 a. an input module for receiving a plurality of (I,Q) data symbols;  
4 b. a modulation unit for determining a modulation scheme for calculating a  
5 Logarithmic Likelihood Ratio result for the plurality of (I,Q) data symbols,  
6 wherein the Logarithmic Likelihood Ratio result is substantially  
7 independent of a signal to noise ratio over the modulated signal; and  
8 c. a converter module for converting the Logarithmic Likelihood Ratio result  
9 of the plurality of (I,Q) data symbols into unsigned values.

1 17. (New) The Logarithmic Likelihood Ratio module according to claim 16 further  
2 comprising a gain module for amplifying the plurality of data symbols by a  
3 multiplicative factor.

1 18. (New) The Logarithmic Likelihood Ratio module according to claim 16 further  
2 comprising a PSK module for calculating the Logarithmic Likelihood  
3 Ratio result by determining a slope of the plurality of (I,Q) data symbols in  
4 a phase shift key modulation scheme.

1 19. (New) The Logarithmic Likelihood Ratio module according to claim 16 further  
2 comprising a QAM module for calculating the Logarithmic Likelihood  
3 Ratio result by a determining a slope of the plurality of (I,Q) data symbols  
4 over a quadrature amplitude modulation scheme.

1 20. (New) The Logarithmic Likelihood Ratio module according to claim 19 further  
2 comprising a second QAM module for calculating the Logarithmic  
3 Likelihood Ratio result for a portion of the m bits in parallel with the  
4 QAM module.

- 1     21.    (New) The Logarithmic Likelihood Ratio module according to claim 16 further
- 2           comprising a multiplexer coupled to the modulation unit, wherein
- 3           multiplexer provides the Logarithmic Likelihood Ratio result to the
- 4           converter module.